

film-speaker. Thus, by integrating the film-speaker with a conventional visual advertisement, the conventional visual advertisement such as a poster, a leaflet, a letter paper, a book, a framed advertising display, a hanging placard, a banner, etc., can be made into an audiovisual advertisement which the ears can hear as well as the eyes can see. Therefore, it is possible to manufacture multimedia advertisements with high effectiveness of advertising. Moreover, by applying the film-speaker to blinds, lighting apparatus, or interior articles, etc., a ubiquitous home sound system without speakers can be achieved.

## 【CLAIMS】

### 【Claim 1】

A method of manufacturing a film-speaker using a piezoelectric material and a sound equipment comprising the film-speaker,

A sound equipment with a film-speaker comprising:

a film-speaker unit comprising a piezoelectric film and electrodes formed on both surfaces of the piezoelectric film, wherein both surfaces of the piezoelectric film are reformed by performing a surface treatment using ions with a predetermined energy under a vacuum state to increase an adhesive force, and the electrodes are formed by depositing conductive material on both surfaces of the piezoelectric film;  
a matching transformer connected with the film-speaker unit;  
an amplifier coupled with the matching transformer; and  
a power supply part providing the amplifier with power.

### 【Claim 2】

The sound equipment as defined by claim 1, wherein the piezoelectric film is selected from a group consisting of PVDF and derivatives thereof, polymer blends including an additive such as HFP, and VDF/TrFE.

### 【Claim 3】

The sound equipment as defined by claim 1, wherein the surface treatment to increase an adhesive force comprises the steps of:

positioning the piezoelectric film in a vacuum state, wherein the degree of vacuum is between about 0.05 mTorr and about 10 mTorr; and  
irradiating ions on the piezoelectric film, wherein the ions have an energy level between about 0.2 keV and about 1.5 keV and a current density of ion beam is between about 0.01 mA/cm<sup>2</sup> and about 100 mA/cm<sup>2</sup>.

### 【Claim 4】

The sound equipment as defined by claim 3, wherein the ions are selected from a group

consisting of oxygen, argon, nitrogen, hydrogen, mixtures including oxygen, argon, nitrogen or hydrogen, and other mixture gases.

**【Claim 5】**

The sound equipment as defined by claim 3, wherein the piezoelectric film is positioned at a distance of 1cm to 50cm from a ion generation point.

**【Claim 6】**

The sound equipment as defined by claim 1, wherein the conductive material to form the electrodes is selected from a group consisting of platinum, gold, silver, copper, chromium, nickel, aluminium, ITO, IGO, AGO, sulphur compounds, mixtures including platinum, gold, silver, copper, chromium, nickel, aluminium, ITO, IGO, AGO or sulphur compounds, and a mixture of the above-described conductive material or mixture and a specific solution and material which can increase conductivity and adhesive property.

**【Claim 7】**

The sound equipment as defined by claim 1, wherein the conductive material to form the electrodes is a conductive polymer material.

**【Claim 8】**

The sound equipment as defined by claim 7, wherein the electrodes made from a conductive polymer material further comprises a metal lead line formed on one side of the surface of each electrode.

**【Claim 9】**

The sound equipment as defined by claim 1, further comprising:  
a condenser positioned between the film-speaker unit and the matching transformer, the condenser filtering a low register;  
a dynamic speaker installed between the amplifier and the matching transformer; and  
a coil positioned between the amplifier and the dynamic speaker, the coil filtering a high register.

**【ABSTRACT】**

A method of manufacturing a film-speaker using a piezoelectric material and a sound equipment with the film-speaker are disclosed. A sound equipment with a film-speaker comprises a film-speaker unit, a matching transformer connected with the film-speaker unit, an amplifier coupled with the matching transformer, and a power supply part providing the amplifier with power. The film-speaker unit includes a piezoelectric film and electrodes formed on both surfaces of the piezoelectric film. The surface of the

piezoelectric film are reformed by irradiating ions with a predetermined energy under a vacuum state to increase an adhesive force. The electrodes are formed by depositing conductive material on both surfaces of the piezoelectric film. The sound equipment with a film-speaker further includes a condenser positioned between the film-speaker unit and the matching transformer, a dynamic speaker installed between the amplifier and the matching transformer, and a coil positioned between the amplifier and the dynamic speaker.